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SAI RAM INSTITUTE OF TECHNOLOGY

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Sai Leo Nagar, West Tambaram, Chennai 600 044 www.sairamit.edu.in

CONTINUOUS ASSESSMENT TEST – II

Question Paper Code 24NU12F044

Course Code - Name : 24BSPH101 – ENGINEERING PHYSICS

Degree & Program : B.E./B.TECH. (Common to all branches)

Date of Exam : 28-11-2024 Year / Semester : I/I

Duration : 1 ½ Hours Max. Marks 50

Answer ALL Questions

PART – A (10× 1 = 10 Marks) K Level CO

1 Which of the following law do not form a Maxwell equation K1 CO3

a)Planck's law b)Gauss's law c)Faraday's law d)Ampere's law

2 A travelling wave is described by the equation $y(x,t) = [0.05\sin(8x - 4t)]\ m$ K2 CO3

The velocity of the wave is

a)8 ms^{-1} b)4 ms^{-1} c)0.5 ms^{-1} d)2 ms^{-1}

3 The relation between electric and magnetic field vector in free space is K1 CO3

a) $\frac{E}{H} = \sqrt{\frac{\varepsilon_0}{\mu_0}}$ b) $\frac{E}{H} = \sqrt{\frac{\mu_0}{\varepsilon_0}}$ c) $\frac{H}{E} = \sqrt{\frac{\varepsilon_0}{\mu_0}}$ d) $\frac{H}{E} = \sqrt{\frac{\mu_0}{\varepsilon_0}}$

4 If E and B denote electric and magnetic fields respectively, which of the following is dimensionless K2 CO3

a) $\sqrt{\varepsilon_0\mu_0}\frac{E}{B}$ b) $\mu_0\varepsilon_0\frac{E}{B}$ c) $\mu_0\varepsilon_0\left(\frac{E}{B}\right)^2$ d) $\frac{E}{\varepsilon_0}\frac{\mu_0}{B}$

5 The radiation pressure for total reflection of EM radiation is K1 CO3

a) $P = \frac{C}{I}$ b) $P = \frac{I}{C}$ c) $P = \frac{2C}{I}$ d) $P = \frac{2I}{C}$

6 As the wavelength of radiation decreases the intensity of the black body radiation ———— K2 CO4

a) Increases b)Decreases

c) First increases then decreases c)First decreases then increases

7 Rayleigh Jean's law holds good for K2 CO4

a)Shorter wavelength b)Longer Wavelength

c)X Ray region d)All types of wavelengths

8 If the kinetic energy of an electron becomes 9 times, then de-Broglie K2 CO4

wavelength becomes

a)9 times b)1/9 times c)3 times d)1/3 times

9 For a particle in a box, the finite potential region is K1 CO4

a)$x > a$ b)$x < 0$ c)$0 < x < a$ d) $0 \geq x \geq a$

10 The normalized wave function in the particle in a box is given by K1 CO4

a) $\psi_n = \sqrt{\frac{2}{a}} \sin\frac{n\pi x}{a}$ b) $\psi_n = \sqrt{\frac{2}{a}} \sin\frac{n\pi x}{2a}$

c) $\psi_n = \sqrt{\frac{a}{2}} \sin\frac{n\pi x}{a}$ d) $\psi_n = \sqrt{\frac{a}{2}} \sin\frac{n\pi x}{2a}$

PART – B (10× 2 = 20 Marks) K-Level CO

11 Write down the integral and differential form of Maxwell's equation from Faraday's law of electromagnetic induction. K1 CO3

12 Write the significance of Maxwell's equation div.B = 0. K2 CO3

13 Write down the properties of electromagnetic waves. K1 CO3

14 What is polarization? K1 CO3

15 Explain about the momentum and energy of electromagnetic waves. K2 CO3

16 DefinePlanck's radiation law. K1 CO4

17 What is the physical significance of wave function? K2 CO4

18 Calculate the minimum energy of an electron can possess in an infinitely deep potential well of width 4 nm. K2 CO4

19 State the properties of matter waves. K1 CO4

20 What is quantum tunneling? K1 CO4

PART – C (2 × 10 = 20 Marks) Mark Split up K-Level CO

21. a) Using Maxwell's equation, derive the electromagnetic wave equation. 10 K2 CO3

OR

b) Discuss the path taken by electromagnetic waves when they move from a vacuum to a non-conducting substance. 10 K2 CO3

22. a) Derive Schrodinger's time-independent and time dependent wave equations. 10 K2 CO4

OR

b) Describe the principle, construction and working of Scanning Tunneling Microscope with neat sketch. 10 K2 CO4